What is claimed is:

1. An optical pickup apparatus, comprising:

a first light source to emit a light flux of a wavelength $\lambda 1$ for conducting recording and/or reproducing information for a first optical information recording medium having a protective substrate having a thickness t1;

a second light source to emit a light flux of a wavelength $\lambda 2$ ($\lambda 1 < \lambda 2$) for conducting recording and/or reproducing information for a second optical information recording medium having a protective substrate having a thickness t2 ($t1 \leq t2$);

a third light source to emit a light flux of a wavelength $\lambda 3$ ($\lambda 2 < \lambda 3$) for conducting recording and/or reproducing information for a third optical information recording medium having a protective substrate having a thickness t3 ($t2 < t3$);

an objective optical element into which an infinite parallel light flux comes when recording and/or reproducing information is conducted for the first, second and third optical information recording mediums; and

a diffractive optical element located on a common optical path for the first, second and third light sources and having a diffractive structure;

wherein a converged-light spot is formed on the first optical information recording medium with m-th order (m is a natural number) diffracted-light ray of the wavelength λ1 generated by the diffractive optical element,

a converged-light spot is formed on the second optical information recording medium with n-th order (n is a natural number) diffracted-light ray of the wavelength λ2 generated by the diffractive optical element, and

a converged-light spot is formed on the third optical information recording medium with k-th order (k is a natural number) diffracted-light ray of the wavelength λ3 generated by the diffractive optical element, and wherein one of m, n and k is different from one of other two numbers.

2. The optical pickup apparatus of claim 1, wherein the diffractive optical element is the objective optical element.

3. The optical pickup apparatus of claim 1, wherein the diffractive optical element is a collimator.

4. The optical pickup apparatus of claim 1, wherein the diffractive optical element is an optical element provided separately from the objective optical element and a collimator.

5. The optical pickup apparatus of claim 1, further comprising:

a first compatible optical element located on a common optical path for the first, second and third light sources and

a second compatible optical element located on an optical path for only one of the first, second and third light sources or a common path for two light sources of the first, second and third light sources,

wherein the first compatible optical element has a first compatible function to form a converged-light spot necessary for recording and/or reproducing information for at least one of the first, second and third optical information recording mediums, and

wherein the second compatible optical element has in combination with the first compatible optical element a second compatible function to form a converged-light spot necessary for recording and/or reproducing information for optical information recording mediums other than the at least one of the first, second and third optical information recording mediums.

6. The optical pickup apparatus of claim 5, wherein the first compatible optical element is the objective optical element.

7. The optical pickup apparatus of claim 5, wherein the second compatible optical element is a dichroic filter.

8. The optical pickup apparatus of claim 5, wherein the second compatible optical element is a liquid crystal element.

9. The optical pickup apparatus of claim 5, wherein the second compatible optical element is a diffractive optical element.

10. The optical pickup apparatus of claim 5, wherein reproducing and/or recording information is conducted for an optical information recording medium in such a way that a light flux comes into an objective optical element so as to have an equal magnification for all of the first, second and third optical information recording mediums and the first and second compatible functions corrects a spherical aberration due to difference in wavelength and a spherical aberration due to difference in thickness among the optical information recording mediums.

11. The optical pickup apparatus of claim 5, wherein reproducing and/or recording information is conducted for an optical information recording medium in such a way that a light flux comes into an objective optical element so as to have respective different magnifications for the first, second and third optical information recording mediums and the first and second compatible functions corrects a spherical aberration due to difference in wavelength, a spherical aberration due to difference in thickness among the optical information recording mediums and a spherical aberration due to difference in the magnification of the light flux coming into the objective optical element.

12. The optical pickup apparatus of claim 1, wherein m is 2.

13. The optical pickup apparatus of claim 1, wherein n is 1.

14. The optical pickup apparatus of claim 1, further comprising:

an optical correcting structure to conduct temperature compensation and chromatic aberration compensation.

15. An optical pickup apparatus, comprising:

a first light source to emit a light flux of a wavelength $\lambda 1$ for conducting recording and/or reproducing information for a first optical information recording medium having a protective substrate having a thickness t1;

a second light source to emit a light flux of a wavelength $\lambda 2$ ($\lambda 1 < \lambda 2$) for conducting recording and/or reproducing information for a second optical information recording medium having a protective substrate having a thickness t2 ($t1 \leq t2$);

a third light source to emit a light flux of a wavelength $\lambda3$ ($\lambda2 < \lambda3$) for conducting recording and/or reproducing information for a third optical information recording medium having a protective substrate having a thickness t3 (t2 < t3);

a diffractive optical element located at a common optical path for the first, second and third light sources;

a compatible optical element located closer to the light source side that the diffractive optical element and to change an optical action for each wavelength;

wherein an infinite parallel light flux comes into the compatible optical element when recording and/or reproducing information is conducted for the first, second and third optical information recording mediums,

wherein the diffractive optical element forms a converged-light spot sufficient for conducting reproducing and/or recording information at least for the first optical information recording medium and generates different order diffracted-light ray for the light flux of the wavelength $\lambda2$ or the light flux of the wavelength $\lambda3$ from the order of a diffracted-light ray of the light flux of the wavelength $\lambda1$, and

wherein the compatible optical element generates a different optical action for the second optical information recording medium and the third optical information recording medium from the optical action for the light flux of the wavelength $\lambda 1$ and forms a converged-light spot sufficient for conducting reproducing and/or recording information for the second optical information recording medium and the third optical information recording medium by being combined with the optical action of the diffractive optical element.

16. The optical pickup apparatus of claim 15, wherein the thickness t1 is equal to the thickness t2.

17. The optical pickup apparatus of claim 15, wherein the diffractive optical element is an objective optical element.

18. The optical pickup apparatus of claim 17, wherein the objective optical element is a single lens.

19. The optical pickup apparatus of claim 17, wherein the objective optical element is plural lenses.

20. The optical pickup apparatus of claim 15, wherein the compatible optical element does not cause an optical effect for the light flux of the wavelength $\lambda 1$.

21. The optical pickup apparatus of claim 15, wherein the compatible optical element is a liquid crystal element.

22. The optical pickup apparatus of claim 21, wherein the electrically energized condition of the liquid crystal element is made different in accordance with the wavelength of the incident light flux so as to change the optical action.

23. The optical pickup apparatus of claim 15, wherein the compatible optical element is a movable beam expander.

24. The optical pickup apparatus of claim 23, wherein the movable beam expander is moved along the optical axis in accordance with the wavelength of the incident light flux.

25. The optical pickup apparatus of claim 16, wherein the diffractive optical element and the compatible optical

element are held in the form of the same driving device and are driven by a single driving device.

26. The optical pickup apparatus of claim 16, wherein the diffractive optical element has a multi level structure.

27. The optical pickup apparatus of claim 16, wherein the diffractive optical element forms a converged-light spot insufficient for conducting reproducing and/or recording information for the second optical information recording medium and the third optical information recording medium.

28. The optical pickup apparatus of claim 16, wherein the diffractive optical element has a diffractive surface to form a converged-light spot necessary for reproducing and/or recording information by respective different order diffracted-light rays for the first optical information recording medium and the second optical information recording medium.

29. The optical pickup apparatus of claim 28, wherein the diffractive surface is provided on an entire surface of an optical functional surface of the diffractive optical element

and is a diffractive surface to correct a spherical aberration due to difference in wavelength between the wavelength $\lambda 1$ and the wavelength $\lambda 2$.

30. The optical pickup apparatus of claim 28, wherein the diffractive surface corrects a spherical aberration caused by difference in thickness between the thickness t1 and the thickness t3 and a spherical aberration due to difference in wavelength between the wavelength $\lambda 1$ and the wavelength $\lambda 3$.

31. The optical pickup apparatus of claim 15, wherein the diffractive optical element generates k-th order (k is a natural number) diffracted-light ray for the light flux of the wavelength $\lambda 1$, m-th order (m is a natural number) diffracted-light ray for the light flux of the wavelength $\lambda 2$, and n-th order (n is a natural number) diffracted-light ray for the light flux of the wavelength $\lambda 3$.

32. The optical pickup apparatus of claim 31, wherein $m \neq n$.

33. The optical pickup apparatus of claim 31, wherein $m = n$.

34. The optical pickup apparatus of claim 31, wherein $k = 1$, $m = 0$ and $n = 2$.

35. The optical pickup apparatus of claim 31, wherein $k = 2$, $m = 1$ and $n = 1$.

36. The optical pickup apparatus of claim 31, wherein $k = 2$, $m = 1$ and $n = 0$.

37. The optical pickup apparatus of claim 31, wherein $k = 2$, $m = 2$ and $n = 1$.

38. The optical pickup apparatus of claim 31, wherein $k = 3$, $m = 2$ and $n = 2$.

39. The optical pickup apparatus of claim 31, wherein $k = 4$, $m = 3$ and $n = 2$.

40. The optical pickup apparatus of claim 31, wherein k = 5, m = 3 and n = 2.

41. The optical pickup apparatus of claim 31, wherein k = 5, m = 3 and n = 3.

42. The optical pickup apparatus of claim 31, wherein k = 6, m = 4 and n = 3.

43. The optical pickup apparatus of claim 31, wherein k = 7, m = 4 and n = 4.

44. The optical pickup apparatus of claim 31, wherein k = 8, m = 5 and n = 4.

45. An optical pickup apparatus, comprising:

a first light source to emit a light flux of a wavelength $\lambda 1$ for conducting recording and/or reproducing information for a first optical information recording medium having a protective substrate having a thickness t1;

a second light source to emit a light flux of a wavelength $\lambda 2$ ($\lambda 1 < \lambda 2$) for conducting recording and/or

reproducing information for a second optical information recording medium having a protective substrate having a thickness t2 ($t1 \leq t2$);

a third light source to emit a light flux of a wavelength $\lambda 3$ ($\lambda 2 < \lambda 3$) for conducting recording and/or reproducing information for a third optical information recording medium having a protective substrate having a thickness t3 ($t2 < t3$);

a diffractive optical element located on a common optical path for the first, second and third light sources and having a diffractive structure;

an objective optical element into which all of light fluxes of the wavelength $\lambda 1$, $\lambda 2$ and $\lambda 3$ come with almost same incident angle when recording and/or reproducing information is conducted for the first, second and third optical information recording mediums; and

wherein a converged-light spot is formed on the first optical information recording medium with m-th order (m is a natural number) diffracted-light ray of the wavelength $\lambda 1$ generated by the diffractive optical element,

a converged-light spot is formed on the second optical information recording medium with n-th order (n is a natural

number) diffracted-light ray of the wavelength $\lambda 2$ generated by the diffractive optical element, and

a converged-light spot is formed on the third optical information recording medium with k-th order (k is a natural number) diffracted-light ray of the wavelength $\lambda 3$ generated by the diffractive optical element, and

wherein one of m, n and k is different from one of other two numbers.

46. The optical pickup apparatus of claim 45, wherein the diffractive optical element is the objective optical element.

47. The optical pickup apparatus of claim 45, wherein all of light fluxes of the wavelength $\lambda 1$, $\lambda 2$ and $\lambda 3$ come into the diffractive optical element as almost infinite parallel light flux.

48. The optical pickup apparatus of claim 45, wherein the diffractive optical element works as a collimator when the light flux of the wavelength $\lambda 1$ comes into.

49. The optical pickup apparatus of claim 45, wherein the diffractive optical element works as a collimator when the light flux of the wavelength $\lambda 2$ comes into.

50. The optical pickup apparatus of claim 45, wherein the diffractive optical element is an optical element provided separately from the objective optical element and a collimator.

51. An optical pickup apparatus, comprising:

a first light source to emit a light flux of a wavelength $\lambda 1$ for conducting recording and/or reproducing information for a first optical information recording medium having a protective substrate having a thickness t1;

a second light source to emit a light flux of a wavelength $\lambda 2$ ($\lambda 1 < \lambda 2$) for conducting recording and/or reproducing information for a second optical information recording medium having a protective substrate having a thickness t2 ($t1 \leq t2$);

a third light source to emit a light flux of a wavelength $\lambda 3$ ($\lambda 2 < \lambda 3$) for conducting recording and/or reproducing information for a third optical information

recording medium having a protective substrate having a thickness t3 ($t2 < t3$);

a first compatible optical element located at a common path for the first, second and third light sources;

a second compatible optical element located on an optical path for only one of the first, second and third light sources or a common path for two light sources of the first, second and third light sources;

a diffractive optical element located on a common optical path for the first, second and third light sources and having a diffractive structure;

wherein the first compatible optical element has a first compatible function to form a converged-light spot necessary for recording and/or reproducing information for at least one of the first, second and third optical information recording mediums,

wherein the second compatible optical element has in combination with the first compatible optical element a second compatible function to form a converged-light spot necessary for recording and/or reproducing information for optical information recording mediums other than the at least one of the first, second and third optical information recording mediums,

wherein plural ring-shaped optical surfaces are formed around the optical axis on at least one optical surface of at least one optical element of the first compatible optical element, the second compatible optical element and the diffractive optical element and the plural ring-shaped optical surfaces are formed continuously through stepped surfaces, wherein a converged-light spot is formed on the first optical information recording medium with m-th order (m is a natural number) diffracted-light ray of the wavelength $\lambda 1$ generated by the diffractive optical element,

a converged-light spot is formed on the second optical information recording medium with n-th order (n is a natural number) diffracted-light ray of the wavelength $\lambda 2$ generated by the diffractive optical element, and

a converged-light spot is formed on the third optical information recording medium with k-th order (k is a natural number) diffracted-light ray of the wavelength $\lambda 3$ generated by the diffractive optical element, and

wherein one of m, n and k is different from one of other two numbers.

52. The optical pickup apparatus of claim 51, wherein the first compatible optical element is the objective optical element.

53. The optical pickup apparatus of claim 51, wherein the second compatible optical element is a phase difference plate.

54. The optical pickup apparatus of claim 51, wherein the second compatible optical element is a liquid crystal element.

55. The optical pickup apparatus of claim 51, wherein the second compatible optical element is a diffractive optical element.

56. The optical pickup apparatus of claim 51, wherein a light converging system is constructed by the first compatible optical element, the second compatible element, the diffractive optical element and the objective optical element and has almost equal optical system magnification for light fluxes of the wavelength λ1 λ2 and λ3 respectively, and the first compatible optical element and the second

compatible element corrects a spherical aberration due to difference in wavelength and a spherical aberration due to difference in thickness of the protective substrate among the optical information recording mediums.

57. The optical pickup apparatus of claim 56, wherein the optical system magnification is almost zero.

58. The optical pickup apparatus of claim 51, wherein a light converging system is constructed by the first compatible optical element, the second compatible element, the diffractive optical element and the objective optical element and has different optical system magnification for light fluxes of the wavelength λ1, λ2 and λ3 respectively, and the first compatible optical element and the second compatible element corrects a spherical aberration due to difference in wavelength, a spherical aberration due to difference in thickness of the protective substrate among the optical information recording mediums, and a spherical aberration due to difference in optical system magnification.

59. The optical pickup apparatus of claim 51, further comprising:

a optical correcting element to conduct spherical aberration compensation and/or chromatic aberration compensation due to change in temperature for at least one converged-light spot among converged-light spots formed on the first, second and third optical information recording mediums.

60. The optical pickup apparatus of claim 51, wherein when a numerical aperture for the converged-light spot formed on the first optical information recording medium with the light flux of the wavelength $\lambda 1$ is NA1, a numerical aperture for the converged-light spot formed on the second optical information recording medium with the light flux of the wavelength $\lambda 2$ is NA2, and a numerical aperture for the converged-light spot formed on the first optical information recording medium with the light flux of the wavelength $\lambda 1$ is NA1, a numerical aperture for the converged-light spot formed on the third optical information recording medium with the light flux of the wavelength $\lambda 3$ is NA3, the following formulas are satisfied:

$NA3 < NA1$ and $NA3 < NA2$

61. The optical pickup apparatus of claim 60, wherein the plural ring-shaped optical surfaces is at least one optical surface of at least one optical element of the first compatible optical element, the second compatible optical element and the diffractive optical element and is formed on a region at which the light flux of the wavelength λ3 and forming a converged-light spot of a numerical aperture NA3 on the third optical information recording medium passes through, and

wherein when among the plural ring-shaped optical surfaces, a ring-shaped optical surface including the optical axis is Rs and a ring-shaped optical surface located farthest from the optical axis is R1, a light flux of the wavelength λ1, λ2 and λ3 having passed through the ring-shaped optical surface Rs is used for conducting reproducing and/or recording respective optical information recording mediums, a converged-light spot is formed on the third optical information recording medium with k-th order (k is a natural number) diffracted-light ray of a light flux of the wavelength λ3 generated by a first diffractive structure and a light flux of the wavelength λ3 having passed through the ring-shaped optical surface R1 is used for conducting

reproducing and/or recording information for the third optical information recording medium.

62. The optical pickup apparatus of claim 60, wherein the first diffractive structure is formed at a region on at least one optical surface of the diffractive optical element at which a light flux of the wavelength $\lambda 3$ forming a converged-light spot of a numerical aperture NA3 on the third optical information recording medium passes through, a converged-light spot is formed on the third optical information recording medium with k-th order (k is a natural number) diffracted-light ray generated by the first diffractive structure and the following formulas are satisfied:

$$k = m/2$$

$$370 \text{ nm} < \lambda 1 < 430 \text{ nm}$$

$$760 \text{ nm} < \lambda 3 < 810 \text{ nm}$$

63. The optical pickup apparatus of claim 61, wherein a light flux of each of the wavelength $\lambda 1$ and $\lambda 2$ having passed through the ring-shaped optical surface Rs is converged on an information recording plane of respective optical information recording mediums with almost no aberration.

64. The optical pickup apparatus of claim 62, wherein the ring-shaped optical surface and the first diffractive structure are formed on the same surface of the diffractive optical element.

65. The optical pickup apparatus of claim 61, wherein the diffraction efficiency of each of the m-th order diffracted-light ray and the m-th order diffracted-light ray is 80% or more.

66. The optical pickup apparatus of claim 61, wherein the diffraction efficiency of the k-th order diffracted-light ray is 40% or more.

67. The optical pickup apparatus of claim 61, wherein the wavefront aberration of the converged-light spot formed on the third optical information recording medium with a light flux of the wavelength λ3 is 0.05 λ3rms or less.

68. The optical pickup apparatus of claim 61, wherein a paraxial light ray a light flux of the wavelength λ3 is

converged at the light source side of a position where the wavefront aberration of a converged-light spot formed on the third optical information recording medium with a light flux of the wavelength $\lambda 3$ becomes smallest.

69. The optical pickup apparatus of claim 61, wherein a light flux of the wavelength $\lambda 1$ and a light flux of the wavelength $\lambda 2$ come into the diffractive optical element with the same divergent angle or as the same infinite light flux and the first diffractive structure corrects a spherical aberration caused by a refractive function of an optical surface provided with the first diffractive structure due to a cause of difference between the wavelength $\lambda 1$ and the wavelength $\lambda 2$ and a spherical aberration caused by difference between the thickness t1 and the thickness t2 in the protective substrate by a diffractive effect due to difference between the wavelength $\lambda 1$ and the wavelength $\lambda 2$.

70. The optical pickup apparatus of claim 61, wherein $m = 8$ and $n = 5$.

71. The optical pickup apparatus of claim 61, wherein m = 6 and n = 4.

72. The optical pickup apparatus of claim 61, wherein m = 2 and n = 4.

73. The optical pickup apparatus of claim 72, wherein k = 1.

74. The optical pickup apparatus of claim 72, wherein k = 0.

75. The optical pickup apparatus of claim 61, wherein m = 5 and n = 3.

76. The optical pickup apparatus of claim 75, wherein k = 2.

77. The optical pickup apparatus of claim 61, wherein m = 2 and n = 2.

78. The optical pickup apparatus of claim 77, wherein k = 1.

79. The optical pickup apparatus of claim 61, wherein m = 3 and n = 2.

80. The optical pickup apparatus of claim 79, wherein k = 2.

81. The optical pickup apparatus of claim 61, wherein m = 10 and n = 5.

82. The optical pickup apparatus of claim 61, wherein the first diffractive structure comprises plural diffractive ring-shaped zones formed around the optical axis on a predetermined aspherical surface-shaped optical surface and a optical path difference providing structure to provide a predetermined optical path for a predetermined light flux passing through a ring-shaped zone on at least the ring-shaped zone among the plural diffractive ring-shaped zones,

wherein an optical surface of the diffractive ring-shaped zone has a substantial inclination for the predetermined aspherical surface-shaped optical surface, and when it is supposed that there is not provided the optical path difference providing structure, the optical surface

diffracts B1-th order diffracted-light ray of the wavelength $\lambda 1$ so as to have the largest diffraction efficiency, diffracts B2-th order diffracted-light ray of the wavelength $\lambda 2$ so as to have the largest diffraction efficiency and diffracts B3-th order diffracted-light ray of the wavelength $\lambda 3$ so as to have the largest diffraction efficiency,

wherein the optical difference providing structure provides the diffractive light rays with an optical path difference respectively with which m-th order diffracted-light ray of the wavelength $\lambda 1$ has the largest diffraction efficiency, n-th order diffracted-light ray of the wavelength $\lambda 2$ has the largest diffraction efficiency and k-th order diffracted-light ray of the wavelength $\lambda 3$ has the largest diffraction efficiency, and

wherein the following formulas are satisfied:

$m = mB1 - mD$

$n = mB2 - mD + (-1, 0 \text{ or } 1)$

$k = mB3 - mD + (-1, 0 \text{ or } 1)$

where mD represents a diffraction order of each light flux when it is supposed that there is not provided the optical path difference structure (it is supposed that there is provided on the diffractive structure).

83. The optical pickup apparatus of claim 61, wherein the following formula is satisfied:

$1.9 \times \lambda 1 \leq \lambda 3 \leq 2.1 \times \lambda 1$

84. The optical pickup apparatus of claim 62, wherein a light flux of the wavelength $\lambda 3$ having passed through the ring-shaped optical surface Rs and a light flux of the wavelength $\lambda 3$ having passed through the ring-shaped optical surface R1 are converged distantly 10 μm or more in the optical axis direction from each other.

85. The optical pickup apparatus of claim 62, wherein a phase difference ϕ between a light flux of the wavelength $\lambda 3$ having passed through the ring-shaped optical surface Rs and a light flux of the wavelength $\lambda 3$ having passed through a ring-shaped optical surface other than the ring-shaped optical surface Rs satisfies the following formula:

$-0.1\pi \leq \phi \leq 0.1\pi$

86. The optical pickup apparatus of claim 84, wherein a light flux of the wavelength $\lambda 3$ changes a phase difference

before and after passing neighboring ring-shaped optical surfaces.

87. The optical pickup apparatus of claim 84, wherein at least one of a light flux of the wavelength $\lambda 1$ and a light flux of the wavelength $\lambda 2$ do not change a phase difference before and after passing neighboring ring-shaped optical surfaces.

88. The optical pickup apparatus of claim 84, wherein the number of the plural ring-shaped optical surfaces is 2 to 10.

89. The optical pickup apparatus of claim 62, wherein a first diffractive structure is formed at a region where a light flux of each of the wavelength $\lambda 1$, $\lambda 2$ and $\lambda 3$ to form a converged-light spot on respective optical information recording mediums passes after having passed through the ring-shaped optical surface Rs and

wherein a light converged position fB3 of a light flux of the wavelength $\lambda 3$ to form a converged-light spot after having passed through the ring-shaped optical surface R1 satisfies the following formula in the optical axis direction

for a best image forming position of a converged-light spot formed on the third optical information recording medium with a light flux of the wavelength $\lambda 3$:

$$|fB3| \leq 5\ \mu m$$

90. The optical pickup apparatus of claim 89, wherein a region on an optical surface provided with the first diffractive structure where a light flux of each of the wavelength $\lambda 1$, $\lambda 2$ and $\lambda 3$ to form a converged-light spot on respective optical information recording mediums passes after having passed through the ring-shaped optical surface R1 passes is a refractive surface.

91. The optical pickup apparatus of claim 89, wherein a second diffractive structure is formed on a region on an optical surface provided with the first diffractive structure where a light flux of each of the wavelength $\lambda 1$, $\lambda 2$ and $\lambda 3$ to form a converged-light spot on respective optical information recording mediums passes after having passed through the ring-shaped optical surface R1 passes.

92. The optical pickup apparatus of claim 91, wherein when a light flux of each of the wavelength λ1, λ2 and λ3 comes into, a combination of diffracted-light rays having the largest diffraction efficiency among diffracted-light rays of each light flux generated by the first diffractive structure and a combination of diffracted-light rays having the largest diffraction efficiency among diffracted-light rays of each light flux generated by the second diffractive structure are different from each other.

93. The optical pickup apparatus of claim 92, wherein when a light flux of each of the wavelength λ1, λ2 and λ3 comes into, a combination of diffracted-light rays having the largest diffraction efficiency among diffracted-light rays of each light flux generated by the second diffractive structure is 1, 1, and 1.

94. The optical pickup apparatus of claim 89, wherein a light flux of the wavelength λ1 having passed through the ring-shaped optical surface R1 is converged on an information recording plane of the first optical information recording medium with almost no aberration.

95. The optical pickup apparatus of claim 89, wherein a light flux of the wavelength $\lambda 2$ having passed through the ring-shaped optical surface R1 is converged on an information recording plane of the second optical information recording medium with almost no aberration.

96. The optical pickup apparatus of claim 89, wherein the ring-shaped optical surface R1 comprises two serial stepped surface and a length parallel to the optical axis of a stepped surface closer to the optical axis is shorter than that of other stepped surface.

97. The optical pickup apparatus of claim 89, wherein the number of the ring-shaped optical surfaces is 2.

98. The optical pickup apparatus of claim 60, wherein the length D in the optical axis direction of the stepped surface satisfies the following formula:

$$1.5\ \mu m \leq D \leq 4.5\ \mu m$$

99. Plural optical elements for use in an optical pickup apparatus which comprises:

a first light source to emit a light flux of a wavelength $\lambda 1$ for conducting recording and/or reproducing information for a first optical information recording medium having a protective substrate having a thickness t1;

a second light source to emit a light flux of a wavelength $\lambda 2$ ($\lambda 1 < \lambda 2$) for conducting recording and/or reproducing information for a second optical information recording medium having a protective substrate having a thickness t2 ($t1 \leq t2$);

a third light source to emit a light flux of a wavelength $\lambda 3$ ($\lambda 2 < \lambda 3$) for conducting recording and/or reproducing information for a third optical information recording medium having a protective substrate having a thickness t3 ($t2 < t3$);

the plural optical elements comprising:

a diffractive optical element located on a common optical path for the first, second and third light sources and having a diffractive structure;

an objective optical element into which all of light fluxes of the wavelength $\lambda 1$, $\lambda 2$ and $\lambda 3$ come with almost same

incident angle when recording and/or reproducing information is conducted for the first, second and third optical information recording mediums; and

wherein a converged-light spot is formed on the first optical information recording medium with m-th order (m is a natural number) diffracted-light ray of the wavelength $\lambda 1$ generated by the diffractive optical element,

a converged-light spot is formed on the second optical information recording medium with n-th order (n is a natural number) diffracted-light ray of the wavelength $\lambda 2$ generated by the diffractive optical element, and

a converged-light spot is formed on the third optical information recording medium with k-th order (k is a natural number) diffracted-light ray of the wavelength $\lambda 3$ generated by the diffractive optical element, and

wherein one of m, n and k is different from one of other two numbers.

100. Plural optical elements for use in an optical pickup apparatus which comprises:

a first light source to emit a light flux of a wavelength $\lambda 1$ for conducting recording and/or reproducing

information for a first optical information recording medium having a protective substrate having a thickness t1;

a second light source to emit a light flux of a wavelength $\lambda 2$ ($\lambda 1 < \lambda 2$) for conducting recording and/or reproducing information for a second optical information recording medium having a protective substrate having a thickness t2 ($t1 \leq t2$);

a third light source to emit a light flux of a wavelength $\lambda 3$ ($\lambda 2 < \lambda 3$) for conducting recording and/or reproducing information for a third optical information recording medium having a protective substrate having a thickness t3 ($t2 < t3$);

the plural optical elements commrising:

a first compatible optical element located at a common path for the first, second and third light sources;

a second compatible optical element located on an optical path for only one of the first, second and third light sources or a common path for two light sources of the first, second and third light sources;

a diffractive optical element located on a common optical path for the first, second and third light sources and having a diffractive structure;

wherein the first compatible optical element has a first compatible function to form a converged-light spot necessary for recording and/or reproducing information for at least one of the first, second and third optical information recording mediums,

wherein the second compatible optical element has in combination with the first compatible optical element a second compatible function to form a converged-light spot necessary for recording and/or reproducing information for optical information recording mediums other than the at least one of the first, second and third optical information recording mediums,

wherein plural ring-shaped optical surfaces are formed around the optical axis on at least one optical surface of at least one optical element of the first compatible optical element, the second compatible optical element and the diffractive optical element and the plural ring-shaped optical surfaces are formed continuously through stepped surfaces, wherein a converged-light spot is formed on the first optical information recording medium with m-th order (m is a natural number) diffracted-light ray of the wavelength $\lambda 1$ generated by the diffractive optical element,

a converged-light spot is formed on the second optical information recording medium with n-th order (n is a natural number) diffracted-light ray of the wavelength $\lambda 2$ generated by the diffractive optical element, and

a converged-light spot is formed on the third optical information recording medium with k-th order (k is a natural number) diffracted-light ray of the wavelength $\lambda 3$ generated by the diffractive optical element, and

wherein one of m, n and k is different from one of other two numbers.